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Avifauna Associated With Early Growth Vegetation on Clearcuts in the Oregon Coast Ranges

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Abstract

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This paper provides estimates of bird density, diversity, and evenness on 13 clearcut units of the Siuslaw National Forest in the Coast Ranges of Oregon, sampled during 1979, 1980, and 1981. Total density of nesting birds ranged from 322 to 588 per 40.5 hectares (100 acres); there were 15 to 19 species nesting on each site.

Keywords: Bird habitat, population distribution, clearcutting, Oregon (Coast Ranges), Coast Ranges—Oregon.

Introduction

The Oregon Coast Ranges is one of the most heavily logged regions of North America (Beuter and others 1976, Williamson 1973). The usual method of logging in the Coast Ranges involves cutting all standing trees—clearcut logging. Commercial species, primarily Douglas-fir, are removed, and noncommercial hardwoods are usually left lying on the site (see "Study Sites" for a detailed description of silvicultural procedures).[1] Timber harvesting in the Oregon Coast Ranges thus results in a dramatic alteration of habitats used by wildlife.

An increasing demand for timber products, coupled with improved planting stocks and silvicultural techniques, has resulted in shorter rotation periods (the time between successive harvests of a stand) and a greater proportion of total area in relatively early stages of succession (Beuter and others 1976). It is thus essential that an understanding of the animal communities associated with these clearcuts be developed. Knowledge must be gained that not only identifies species characteristic of clearcuts but also quantifies use of clearcuts by species usually associated with mature stands. In this way, forest wildlife biologists can better predict the effects that clearcut logging and shorter rotations will have on wildlife of the region. Few studies, however, have documented the animal communities on clearcuts in the Oregon Coast Ranges.

In this paper we report on the use of clearcuts by birds. Our specific objectives were to: (1) describe the avifauna nesting in early growth vegetation on 13 clearcuts and (2) quantify the use of clearcuts by birds not usually associated with clearcuts. This analysis will enhance understanding of the avian community structure of clearcuts, serve as a data base for the formation of hypotheses during future studies that examine the change in species composition through various successional stages and management practices, and provide insight about the ability of species inhabiting mature and old-growth forest to compensate for habitat alteration by using clearcuts for various activities.

[1]Scientific names for birds and plants are listed on pages 9 and 10.

Literature Review

It is not our intent to review all literature on avian communities associated with clearcuts. Studies dealing with the Pacific Northwest are mentioned below and throughout the text. We list other articles with the hope that this information will aid others in assembling relevant literature; literature cited in these papers offers a further source of material.

There are few major field studies dealing with clearcut logging and avian communities in the Pacific Northwest. Hagar (1960) compared the avifauna of several early growth clearcuts with birds of mature forests in the Douglas-fir region of northwestern California and found that species usually associated with weed and brush seral stages were favored by logging; species requiring mature forests were eliminated when larger trees were removed. In the Puget Sound region of western Washington, Manuwal and Munger found that the brush-dominated stages after clearcut logging had higher total density and diversity of birds than uncut stands had.[2] Here again, species usually associated with mature forests were eliminated (as breeding species) by logging. Mannan (1977) and Mannan and others (1980) compared the avifauna of stands that received various silvicultural treatments (clearcut logging, thinning) in the Oregon Coast Ranges. Total bird density on clearcuts was nearly equal to that in natural Douglas-fir stands 35 to 100 years old but was characterized by ground- and brush-nesting species. Hagar (1960), Mannan (1977), Mannan and others (1980), and Manuwal and Munger (see footnote 2) concluded that the severe reduction in snags by clearcut logging practices greatly reduced the number of primary cavity nesters (for example, woodpeckers) and secondary cavity nesters (bluebirds) on clearcuts.

[2]Manuwal, David A.; Munger, Garet. The effect of timber harvest on bird populations in the Douglas-fir forests of Washington State. Unpublished report on file at the University of Washington, Seattle; 1978.

Study Sites

From known distributions and habitat requirements, Meslow and Wight (1975) and Wight (1974) listed birds likely to be found in different successional stages west of the Cascade Range. Both articles discuss the relative use of, and activity patterns on, various seral stages (including clearcuts) in western Oregon. Although these papers give a useful and much needed description of species occurrences, the information is too general to help forest wildlife biologists quantify the use of clearcuts by birds in the Oregon Coast Ranges.

The effect of clearcut logging on avian communities has received more attention in areas outside the Pacific Northwest. Some of these studies and their general geographical locations include: coniferous forests in the Rocky Mountains and the Southwest—Austin and Perry (1979), Franzreb (1977, 1978), Franzreb and Ohmart (1978), Ramsden and others (1979), and Szaro and Balda (1979a, 1979b); coniferous, mixed-conifer, and hardwood forests in the East and Southeast—Conner and Crawford (1974), Conner and Adkisson (1975), Conner and others (1975, 1979), Michael and Thornburgh (1971), Strelke and Dickson (1980), Titterington and others (1979), and Webb and others (1977); and aspen forests of the intermountain west—DeByle (1981). Articles dealing with the various biological, sociological, and economic issues of clearcut logging include Hooven (1973), Pengelly (1972), Marks and Bormann (1972), and Resler (1972). Finally, we suggest that forest wildlife biologists review Lack (1933) for one of the first discussions of the relation between forestry practices and avian habitat selection.

This study was conducted on 13 clearcuts in the Douglas-fir region of the Oregon Coast Ranges on land administered by the USDA Forest Service, Siuslaw National Forest, Alsea and Hebo Ranger Districts. This region is characterized by subclimax Douglas-fir and climax western hemlock and western redcedar; stands are being converted to near monotypes of Douglas-fir after logging. A thorough description of the forest composition, successional patterns, and various environmental features of this region is given by Franklin and Dyrness (1973).

The specific locations and general topography of all study sites are given in table 1. The selection of clearcuts was based on the following: (1) a minimum size of 20 hectares and (2) clearcuts of early growth and vegetation considered "typical" by Forest Service personnel. All sites were clearcut logged (all commercial and noncommercial trees were cut). After logging, sites were prepared for planting by broadcast burning. Douglas-fir seedlings were then hand planted over an entire site at about 3- by 3-meter spacing. At the time of the study, sites ranged from 4 to 9 years in postplanting age, and precommercial thinning had not yet taken place. Thinning usually takes place 10 to 15 years after planting. During precommercial thinning, deciduous trees and less vigorous conifers are felled to increase the spacing between the remaining conifers. Certain sites received aerial herbicide treatment 4 to 5 years after planting to reduce competition for conifer seedlings from shrubs and deciduous trees. Sprayed and unsprayed (control) study sites were also used for an examination of the effects of herbicide treatment on avian community structure. Although herbicides suppressed shrub growth for a period, plant composition was not markedly different between sprayed and unsprayed sites (Morrison 1982). These results represent a sampling of sites and silvicultural practices likely to be encountered on clearcuts in the Oregon Coast Ranges (rather than only sprayed or unsprayed areas).

For a detailed description of the vegetation on each site, see Franklin and Dyrness (1973). All sites were selected according to obvious structural similarities, and a general description of vegetation structure and species composition follows.

Vegetation was characterized by a dense and ubiquitous shrub layer (40 to 75 percent total cover) dominated by salmonberry, thimbleberry, vine maple, and salal. Dominants in the low shrub-herb layer included swordfern, bracken fern, tansy ragwort, foxglove, pearly everlasting, Oregon oxalis, and various grasses. With an average height of less than 2.0 meters, Douglas-fir had not yet assumed a position of dominance (less than 10 percent cover) on most sites. Red alder provided the only significant vertical structure on the sites. Most alder, ranging up to 8.0 meters in height, were concentrated in gullies and areas of soil disturbance.

Table 1—Description of 13 clearcuts in the Coast Ranges of Oregon

Site number[1/]	Site size	Elevation	Aspect	Plantation age	Years censused	Location
	Hectares	*Meters*		*Years[2/]*		
3403-51	21	300-450	NE	5, 6, 7	1979, 1980, 1981	Lincoln County, Oregon (T. 14 S., R. 9 W.; sec. 14 and 23)
3404-51	24	150-370	NE-SE	4	1979	Lincoln County, Oregon (T. 15 S., R. 10 W.; sec. 4 and 5)
3502-16	31	110-280	NE	7	1979	Lane County, Oregon (T. 15 S., R. 9 W.; sec. 17)
3501-41	26	220-310	NE	7	1979	Lane County, Oregon (T. 15 S., R. 10 W.; sec. 21 and 28)
3503-40	21	300-530	S-N	5	1980	Lane County, Oregon (T. 16 S., R. 9 W.; sec. 5 and 8)
3503-43	25	210-450	SW-NE	6	1980	Lane County, Oregon (T. 16 S., R. 9 W.; sec. 4)
3404-37	26	110-275	S	9	1980	Lincoln County, Oregon (T. 15 S., R. 10 W.; sec. 4)
3401-24	26	220-450	SW	8	1980	Lincoln County, Oregon (T. 14 S., R. 10 W.; sec. 15, 21, and 22)
3503-38	36	150-400	N	4, 5, 6	1979, 1980, 1981	Lane County, Oregon (T. 15 S., R. 9 W.; sec. 31)
1311-165	30	400-530	NW	6	1981	Yamhill County, Oregon (T. 4 S., R. 8 W.; sec. 21)
1304-68	35	350-500	NW-SW	6	1981	Tillamook County, Oregon (T. 3 S., R. 7 W.; sec. 31)
3302-35	24	240-510	NE-SE	7	1981	Lincoln County, Oregon (T. 13 S., R. 9 W.; sec. 34)
3303-14	24	225-300	SW	7	1981	Lincoln County, Oregon (T. 13 S., R. 9 W.; sec. 14)

[1/] U.S. Department of Agriculture, Forest Service site designation; on file at Alsea Ranger Station, Alsea, Oregon.
[2/] At time of each census, the number of years after planting; most seedlings were planted at 2 years of age.

Methods

Avian Census Technique

The census technique used was the variable circular-plot method (Reynolds and others 1980). Of the 13 study sites, 11 were censused for one season each during 1979, 1980, or 1981; and 2 sites were censused for all 3 years. Ten census stations (fixed sampling points) were established on each site. No station was closer than 100 meters to the clearcut edge, nor closer than 100 meters to the next nearest station. Beginning at sunrise, birds were censused at each station for 8 minutes. Censusing birds at the 10 stations on a site required about 2 hours; only one census was conducted per day. Birds on each site were censused once a week during the peak of the nesting season (May to July) for a total of five censuses a year for each site. Results of these censuses were combined to give an estimate of density for each species per site per year. Bird species diversity (Shannon and Weaver 1949) and evenness (Pielou 1966) were also calculated for each site. Birds soaring over and apparently using a site for foraging (for example, raptors), and birds observed before or after a morning census (but not seen during the census) were not recorded, but the time and location of such birds were noted. The mean number of observations per 40.5 hectares was used as the density estimate for these species. Because study sites were visited only during daylight, nocturnal species (owls) are not considered.

Results and Discussion

Nesting Species

Of the 53 species observed on the clearcuts, 22 were nesting (table 2); however, only 11 of these were considered common or abundant. The nesting bird community typical of clearcuts in the Oregon Coast Ranges is dominated by white-crowned and song sparrows, rufous-sided towhee; rufous hummingbird; orange-crowned, MacGillivray's, and Wilson's warblers; willow flycatcher; and Swainson's thrush. Dark-eyed junco, Bewick's wren, American goldfinch, American robin, wrentit, and black-headed grosbeak were regular but relatively uncommon nesters. Cavity-nesting species were extremely rare on all sites.

All the common to abundant nesting species nest and forage on or near the ground; typically used substrates include various shrubs (salmonberry, thimbleberry, salal), Douglas-fir, and deciduous trees (especially red alder). Shrubs and conifer seedlings were widespread over all sites; they provide ample cover for species preferring low, shrubby habitat (sparrows, towhee, hummingbird, orange-crowned and MacGillivray's warblers). More local in distribution were species that included deciduous trees (red alder, for example) in their habitat. Density of several species, especially the Wilson's warbler, Swainson's thrush, and black-headed grosbeak, appeared to be related to the density of red alder.

Primary and secondary cavity-nesting species were extremely rare as breeding species on all study sites. Seldom did a site have more than 2 to 10 snags of adequate size (>20-30 cm in d.b.h. and >4-6 m in height) to be suitable as nesting sites for most cavity nesters; see Bull (1978), Thomas and others (1979), and Mannan and others (1980). A 30-hectare clearcut would typically support one nesting pair of either hairy woodpecker, western bluebird, or chestnut-backed chickadee; several sites had no nests of cavity-nesting species.

The total density of nesting individuals ranged from 322 to 588 birds per 40.5 hectares (table 3). Species richness ranged from 15 to 19 species per site, diversity from 2.27 to 2.60, and evenness from 0.834 to 0.900. Mannan (1977) found a similar diversity (2.63) for the avian community on 10-year-old clearcuts in the Oregon Coast Ranges. Nonnesting birds were not included in overall density and diversity because of the often sporadic occurrence and varied activities of these species.

For all sites, total density of nesting birds was lower in 1980 compared with 1979 and 1981. Reasons for such variation in density are obscure but may include weather conditions, food availability, observer error, or other factors. Caution should be used if census data are used to make comparisons between sites and years.

Table 2—Estimated density, frequency of occurrence, and abundance of avifauna associated with early growth vegetation in 13 clearcuts in the Oregon Coast Ranges, by activity and species

Activity and species	Birds per 40.5 ha				Frequency of occurrence by census (by site)				Abundance[1]/
	1979	1980	1981	$\bar{X}$	1979	1980	1981	$\bar{X}$	
	Number				*Percent*				
Nesting:									
Willow flycatcher	37.6	12.0	39.7	29.8	84 (100)	87 (100)	100 (100)	90 (100)	C
American goldfinch	49.0	22.5	27.8	33.1	100 (100)	97 (100)	100 (100)	99 (100)	C
Rufous-sided towhee	38.0	29.0	40.7	35.9	100 (100)	100 (100)	100 (100)	100 (100)	C
Dark-eyed junco	23.4	8.5	17.3	16.4	96 (100)	87 (100)	100 (100)	94 (100)	C
White-crowned sparrow	70.8	46.8	47.2	54.9	100 (100)	100 (100)	100 (100)	100 (100)	A
Song sparrow	42.6	43.8	67.7	51.4	100 (100)	100 (100)	100 (100)	100 (100)	A
Bewick's wren	12.5	6.8	6.0	8.4	80 (80)	87 (100)	83 (100)	83 (93)	U
American robin	6.8	3.5	7.7	6.0	84 (100)	90 (100)	100 (100)	91 (100)	U
Swainson's thrush	38.0	47.8	74.7	53.5	84 (100)	100 (100)	100 (100)	95 (100)	A
MacGillivray's warbler	25.0	20.2	29.8	25.0	100 (100)	100 (100)	100 (100)	100 (100)	C
Orange-crowned warbler	43.2	33.0	24.0	33.4	100 (100)	100 (100)	100 (100)	100 (100)	C
Wilson's warbler	23.6	19.2	23.2	22.0	100 (100)	100 (100)	100 (100)	100 (100)	C
Rufous hummingbird	69.4	56.7	39.0	55.0	100 (100)	100 (100)	100 (100)	100 (100)	A
Black-headed grosbeak	6.2	1.5	13.0	6.9	88 (100)	67 (100)	79 (83)	78 (94)	U
Wrentit	7.0	3.3	2.5	4.3	40 (40)	37 (67)	17 (33)	31 (47)	R
Mountain quail	3.5	4.0	4.0	3.8	20 (40)	7 (17)	8 (17)	12 (25)	S
Hairy woodpecker	.4	.2	.2	.3	84 (100)	87 (100)	38 (83)	70 (94)	U
Western bluebird	.3	.2	.2	.3	56 (80)	27 (50)	17 (17)	33 (49)	R
Violet-green swallow	3.0	1.0	1.0	2.0	16 (20)	13 (33)	13 (33)	14 (29)	S
Common nighthawk	.2	.1	—	.1	12 (20)	13 (17)	— —	8 (12)	R
Tree swallow	.2	—	.2	.2	16 (20)	— —	17 (17)	11 (12)	S
Chestnut-backed chickadee	1.0	1.5	2.0	1.5	8 (20)	27 (50)	63 (83)	33 (51)	U
Foraging:									
Warbling vireo	4.0	—	—	4.0	20 (40)	— —	— —	7 (13)	S
Sharp-shinned hawk	.2	.2	—	.2	4 (20)	4 (17)	— —	3 (12)	S
Band-tailed pigeon	5.5	5.0	9.0	6.5	24 (40)	13 (33)	13 (17)	17 (30)	U
Common flicker	.2	.1	.1	.2	92 (100)	60 (83)	25 (67)	59 (83)	U

Table 2—Estimated density, frequency of occurrence, and abundance of avifauna associated with early growth vegetation in 13 clearcuts in the Oregon Coast Ranges, by activity and species—(continued)

Activity and species	Birds per 40.5 ha				Frequency of occurrence by census (by site)				Abundance[1]
	1979	1980	1981	$\bar{X}$	1979	1980	1981	$\bar{X}$	
	Number				*Percent*				
Foraging (continued):									
Yellow-bellied sapsucker	.1	.1	—	.1	12 (60)	7 (33)	— —	6 (31)	S
Downy woodpecker	.1	.1	—	.1	16 (60)	10 (33)	— —	9 (31)	S
Olive-sided flycatcher	2.0	1.0	1.0	1.3	56 (100)	43 (67)	8 (33)	36 (67)	R
Steller's jay	4.6	2.8	2.3	3.2	72 (100)	63 (100)	17 (67)	51 (89)	R
Winter wren	2.0	1.5	—	1.8	28 (80)	13 (50)	— —	14 (43)	S
Purple finch	3.7	2.0	—	2.9	32 (60)	13 (33)	— —	15 (31)	S
Pine siskin	4.0	4.0	—	4.0	12 (40)	7 (17)	— —	6 (19)	S
Cedar waxwing	3.0	4.0	7.3	4.8	24 (80)	23 (67)	13 (67)	20 (71)	R
Western wood pewee	1.0	1.0	1.0	1.0	4 (20)	13 (17)	8 (33)	8 (23)	S
Pileated woodpecker	.2	.1	.2	.2	8 (20)	17 (50)	8 (33)	11 (34)	S
Yellow warbler	2.0	—	—	2.0	8 (20)	— —	— —	3 (7)	S
Red-tailed hawk	.2	—	—	.1	4 (20)	— —	— —	1 (7)	S
Black-capped chickadee	2.5	—	2.0	2.3	4 (30)	— —	8 (33)	4 (18)	S
Common bushtit	2.5	2.0	—	2.3	8 (20)	4 (17)	— —	4 (12)	S
Rough-winged swallow	2.0	—	—	2.0	8 (40)	— —	— —	3 (13)	S
Turkey vulture	1.0	1.0	2.0	1.3	16 (60)	17 (50)	8 (17)	14 (42)	S
Cooper's hawk	—	.2	.2	.2	— —	4 (17)	8 (17)	4 (11)	S
Perching (activity unknown):									
Brown-headed cowbird	4.0	3.5	4.0	3.8	8 (20)	23 (33)	4 (17)	12 (23)	S
Townsend's solitaire	1.3	—	—	1.3	16 (60)	— —	— —	5 (20)	S
Brewer's blackbird	1.0	—	—	1.0	4 (20)	— —	— —	1 (7)	S
Evening grosbeak	3.0	3.0	—	3.0	36 (80)	23 (50)	— —	20 (43)	S
Western tanager	2.0	1.7	3.0	2.2	12 (20)	20 (50)	4 (17)	12 (29)	S
Hermit warbler	3.0	1.0	—	2.0	8 (20)	13 (17)	— —	7 (12)	S
Black-throated gray warbler	3.0	—	—	3.0	16 (40)	— —	— —	5 (13)	S
Chipping sparrow	2.0	—	—	2.0	4 (20)	— —	— —	1 (7)	S
Hutton's vireo	—	2.0	—	2.0	— —	7 (17)	— —	2 (6)	S
Varied thrush	—	—	1.0	1.0	— —	— —	8 (17)	3 (6)	S

[1] For species with greater than 50-percent occurrence: R (rare) = 1 to 4 birds/40.5 ha; U (uncommon) = 5 to 15; C (common) = 16 to 40; A (abundant) = >41. For species with less than about 50-percent occurrence: S (sporadic) = (any density).

Table 3—Density, diversity, evenness, and species richness of birds nesting on clearcuts of early growth timber in the Oregon Coast Ranges, by site number

Site number[1/]	Year censused	Density	Number of species[2/]	Diversity[2/]	Evenness[2/]
		Birds per 40.5 hectares			
3403-51	1979	551	16	2.41	0.870
3403-51	1980	334	15	2.35	.867
3403-51	1981	588	16	2.38	.859
3404-51	1979	552	18	2.60	.900
3502-16	1979	482	19	2.57	.874
3501-41	1979	376	16	2.36	.852
3503-40	1980	361	16	2.39	.863
3503-43	1980	326	16	2.31	.834
3404-37	1980	393	16	2.39	.863
3401-24	1980	376	15	2.27	.838
3503-38	1979	488	16	2.42	.893
3503-38	1980	322	16	2.36	.873
3503-38	1981	556	16	2.43	.877
1311-165	1981	476	16	2.36	.852
1304-68	1981	380	17	2.45	.866
3302-35	1981	410	15	2.40	.886
3303-14	1981	396	15	2.31	.852
$\bar{X}$		433	16	2.40	.867
Standard deviation		88.8	1.1	.08	.020

1/ U.S. Department of Agriculture, Forest Service site designation; on file at Alsea Ranger Station, Alsea, Oregon.

2/ Pielou (1966).

Regularly Observed Species

Many birds regularly encountered on the sites usually nested in adjacent mature stands and used clearcuts for various other activities, especially foraging. Notable in this category were cavity-nesting birds, including hairy and downy woodpeckers, common flicker, yellow-bellied sapsucker, and chestnut-backed chickadee. The pileated woodpecker, a species usually associated with mature and old-growth forests (Bull and Meslow 1977), was observed foraging on down logs on several sites. The black-capped chickadee, which apparently nests in the lower foothills of the Oregon Coast Ranges, sporadically visited clearcuts at higher elevations, especially during the nonnesting season. Other species, including the Steller's jay, purple finch, band-tailed pigeon, cedar waxwing, olive-sided flycatcher, and evening grosbeak were also observed foraging and perching, but not nesting, on clearcuts.

Several of the species listed as "Perching (activity unknown)" or "Foraging" in this study have been observed nesting on clearcuts in the Oregon Coast Ranges—Mannan (1977) recorded the infrequent nesting of the common bushtit, Townsend's solitaire, and house wren on the 10-year-old sites he studied.

Occasionally Observed Species

Birds in this final category were a minor component (by density) of clearcuts in the Oregon Coast Ranges. Included here are the raptorial species, all of which were observed actively foraging over the clearcuts (as opposed to simply flying directly over an area). The sharp-shinned, Cooper's, and red-tailed hawks were seen flying about or perched on the sites only infrequently. Turkey vultures were more common visitors to clearcuts than the hawks, foraging over several sites each year.

The remaining species in this category were mostly passerines that usually nested in surrounding habitats. Included were the warbling and Hutton's vireos; winter wren; brown-headed cowbird; Townsend's solitaire; Brewer's blackbird; pine siskin; western wood pewee; yellow, hermit, and black-throated gray warblers; chipping sparrow; western tanager; common bushtit; and rough-winged swallow. Although brown-headed cowbirds were observed on the clearcuts, the rate of nest parasitism by this species was not assessed.

Avian communities associated with early growth clearcuts in the Oregon Coast Ranges are characterized by species that apparently prefer a shrub-dominated habitat (sprarrows, towhee, certain warblers); such species should be expected as regular nesters on all clearcuts. Where deciduous trees are present, such as in gullies, wet depressions, and along logging roads, species that utilize the vertical structure provided by deciduous trees are found (Wilson's warbler, Swainson's thrush, black-headed grosbeak). Deciduous trees increase both the vertical and horizontal patchiness or heterogeneity of vegetation structure on clearcuts and allow utilization of the sites by a greater number of individuals of certain species compared with sites lacking deciduous trees.

Several authors have recommended that a minimum of 5 or 6 snags per hectare are required to maintain a nesting population of most primary and secondary cavity nesters on an area (Balda 1975; Cunningham and others 1980; Scott 1979; Thomas and others 1979, table 18). Mannan and others (1980) suggested 11 snags per hectare (>48 cm in d.b.h., >4.4 m in height) as an optimum density of snags, indicating that even 6 snags may be insufficient to maintain functional populations of cavity-nesting species in the forest ecosystem (to maintain their role in insect predation). It is thus significant that clearcuts in this study had only about 0.3 snag per hectare. Similarly, Cline and others (1980) found a mean density of 0.5 snag (>9 cm in d.b.h.) per hectare in 10-year-old clearcuts in the Oregon Coast Ranges.

In summary, the following actions could increase the numbers and kinds of birds nesting on clearcuts:

1. Maintain patches of deciduous trees (for example, red alder, bigleaf maple, elderberry). Appropriate places for retention of deciduous trees would be along logging roads and landings, in wet depressions and areas of unstable soils, and along permanent and intermittent (all classes) stream courses, where conifers are often difficult to establish. Patches may be relatively small in area (5 to 10 m by 10 to 20 m; Morrison 1982).

2. Retain snags during logging operations whenever possible; killing and leaving large culls instead of felling them may be necessary. Although the minimum number of snags required was not directly assessed in this study, literature available indicates that 6 snags (>20 to 30 cm in d.b.h., >4-6 m in height) per hectare should be provided on each clearcut, 11 snags may be more appropriate. Data presented in Thomas and others (1979) for eastern Oregon and Washington provide general guidelines for snag management on a species-specific basis that can be followed until similar information is available for western Oregon forests.

3. Leave large (>20-30 cm in d.b.h.), down material (logs) scattered about each site to serve as foraging substrate for woodpeckers and other birds. In addition, various species of amphibians, reptiles, and mammals use logs (Maser and others 1979).

Actions such as these increase the diversity of habitats available for birds and will enhance both species richness and diversity of avian communities on clearcuts.

Common name	Scientific name
Birds:[3]	
Turkey vulture	*Cathartes aura*
Sharp-shinned hawk	*Accipiter striatus*
Cooper's hawk	*Accipiter cooperii*
Red-tailed hawk	*Buteo jamaicensis*
Mountain quail	*Oreortyx pictus*
Band-tailed pigeon	*Columba fasciata*
Common nighthawk	*Chordeiles minor*
Rufous hummingbird	*Selasphorus rufus*
Yellow-bellied sapsucker	*Sphyrapicus varius*
Pileated woodpecker	*Dryocopus pileatus*
Northern flicker	*Colaptes auratus*
Hairy woodpecker	*Picoides villosus*
Downy woodpecker	*Picoides pubescens*
Western wood-pewee	*Contopus sordidulus*
Olive-sided flycatcher	*Contopus borealis*
Willow flycatcher	*Empidonax traillii*
Violet-green swallow	*Tachycineta thalassina*
Tree swallow	*Tachycineta bicolor*
Northern rough-winged swallow	*Stelgidopteryx serripennis*
Steller's jay	*Cyanocitta stelleri*
Black-capped chickadee	*Parus atricapillus*
Chestnut-backed chickadee	*Parus rufescens*
Bushtit	*Psaltriparus minimus*
Wrentit	*Chamaea fasciata*
Bewick's wren	*Thryomanes bewickii*
Winter wren	*Troglodytes troglodytes*
House wren	*Troglodytes aedon*
Townsend's solitaire	*Myadestes townsendi*
American robin	*Turdus migratorius*
Swainson's thrush	*Catharus ustulatus*
Varied thrush	*Ixoreus naevius*
Western bluebird	*Sialia mexicana*
Cedar waxwing	*Bombycilla cedrorum*
Warbling vireo	*Vireo gilvus*
Hutton's vireo	*Vireo huttoni*
Orange-crowned warbler	*Vermivora celata*
MacGillivray's warbler	*Oporornis tolmiei*
Wilson's warbler	*Wilsonia pusilla*
Yellow warbler	*Dendroica petechia*
Black-throated gray warbler	*Dendroica nigrescens*
Hermit warbler	*Dendroica occidentalis*
Brewer's blackbird	*Euphagus cyanocephalus*
Brown-headed cowbird	*Molothrus ater*
Western tanager	*Piranga ludoviciana*
Black-headed grosbeak	*Pheucticus melanocephalus*
Evening grosbeak	*Coccothraustes vespertinus*
Purple finch	*Carpodacus purpureus*
Pine siskin	*Carduelis pinus*
American goldfinch	*Carduelis tristis*
Rufous-sided towhee	*Pipilo erythrophthalmus*
Dark-eyed junco	*Junco hyemalis*
Chipping sparrow	*Spizella passerina*
White-crowned sparrow	*Zonotrichia leucophrys*
Song sparrow	*Melospiza melodia*

[3]Authority for birds is American Ornithologists' Union (1982).

Common name	Scientific name
Plants:[4]	
Douglas-fir	*Pseudotsuga menziesii* (Mirbel) Franco
Western hemlock	*Tsuga heterophylla* (Raf.) Sarg.
Western red cedar	*Thuja plicata* Donn.
Salmonberry	*Rubus spectabilis* Pursh
Thimbleberry	*Rubus parviflorus* Nutt.
Vine maple	*Acer circinatum* Pursh
Salal	*Gaultheria shallon* Pursh
Swordfern	*Polystichum munitum* (Kaulf.) Presl
Tansy ragwort	*Senecio jacobaea* L.
Foxglove	*Digitalis purpurea* L.
Pearly everlasting	*Anaphalis margaritacea* (L.) B. & H.
Oregon oxalis	*Oxalis oregana* Nutt. ex T. & G.
Red alder	*Alnus rubra* Bong.
Aspen	*Populus tremuloides* Michx.
Bigleaf maple	*Acer macrophyllum* Pursh
Elderberry	*Sambuscus racemosa* L.

[4]Authority for plants is Hitchcock and Cronquist (1973).

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English Equivalents of Metric Units

1 hectare = 2.47 inches
1 meter = 39.37 inches
1 centimeter = 0.39 inch

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Keywords: Bird habitat, population distribution, clearcutting, Oregon (Coast Ranges), Coast Ranges—Oregon.

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